

# The Oligochaeta and the Chironomid fauna as pollution indicators in the Criş/Körös<sup>1</sup> river system

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## Abstract

The Oligochaeta and the Chironomid fauna were investigated in the Körös/Criş river system from the spring area to the inflow in the years of 1994-1995, to cover up the species living there. A zero-state was made. Specimen density of Oligochaetae was high on the polluted river parts, *Limnodrilus hoffmeisteri* and *Tubifex tubifex* were dominant there. Specimen density increased by moderated, and decreased by hard pollution effects. More than 50% of the Chironomid species were found in one sample only, which shows mosaic-like fauna. The presented species could not be rare, or threatened, because of the lack of the earlier faunistical investigations. *Brilia longifusca*, *Brilia modesta*, *Rheocricotopus effusus*, *Briophaenocladus nitidicollis*, *Chironomus fluviatilis*, *Paralauterborniella nigrohalteralis* and *Thienemanniella lentiginosa* were typical for clean water river parts. The changes in the fauna picture would show the positive, or negative effects in the river system during future investigations.

**Keywords:** river ecology, invertebrate fauna, Oligochaeta, Chironomid, diversity.

## Introduction

Organisms have to have a continuous contact with their own environment, therefore they reflect the environmental changes. Presence or absence of a species in one ecosystem, its settlement or disappearance are the results of this interaction and answer to one environmental quality.

1 The first name is Romanian, and the second Hungarian.

A lot of species are well known which are sensitive and are able to reflect the effects of the environmental changes. Thienemann (1954) and his contemporaries have already taken note of the fact that some species live on a certain small part of a river, but others appear on longer parts in that same ecosystem. This quality is known for more and more animal group and species as typical, therefore most of them can be used very well to indicate the different environmental effects. The shells (Lamellibranchia) are already common in the immediate monitoring in the past years (Salánki, 1994).

The negative environmental effects to the animals may be short, like oxygen depletion, or longer, like heavy metal pollution and accumulation in the sediment. The injury of the zoocenose follows the environmental injury, and a longer time is needed for the animals to resettle.

Chironomids (non-biting midges) living in the sediment are used commonly for monitoring on population-, coenose-, and ecosystem level, as well as for toxicological tests in the laboratory and on the field, too. Chironomids are of essential importance in the saprobiological qualification (Rosenberg, 1991). Their use is the same in the monitoring of the water ecosystems too (Cushman, 1984; Cushman and Goyert, 1984; Frank, 1983; Szító, 1994; Szító and Waijandt, 1989; Warwick, 1988, 1989).

The registration of the ecological condition started in our common rivers with the Maros/Mureş in 1991, followed by the Szamos/Someş river system in 1993; the River Crişul Alb/Fehér-Körös, River Crişul Negru/Fekete-Körös in 1994, and the River Crişul Repede/Sebes-Körös, River Barcău/Berettyó in 1995. The works were organised and supported by Tisza Klub (Szolnok, Hungary) and Liga Pro Europa (Târgu-Mureş, Romania). No similar examinations had been used on these rivers before our fundamental work (Albu, 1966; Cure, 1964, 1985; Pop, 1943, 1950).

The goals were as follows:

- to throw light on the flora and fauna from the head waters to the mouth
- to registrate the changes in the coenoses by the environmental effects
- to answer the questions of the environmental changes
- to submit recommendations to the governmental and non-governmental organizations for the improvement or for the conservation of the condition of the living resource.

There was crude oil pollution in the River Barcău in November and December 1994. More than 60 tons of the oil were collected from the river during three weeks, but the rest spread to the Körös river system and the River Tisza, too. The pollution effect was examined and published in a separated paper to this monograph.

### *Material and methods*

The sampling places were as follows: River Crișul Alb, River Crișul Negru, River Kettös-Körös, Crișul Repede, and River Barcău. The rivers were sampled from the source to the mouth by a hand net with 250  $\mu\text{m}$  pore mesh size in 1994 and in 1995. The sediment was collected near the bank on the right and the left side and in the main current (Fig. 1.).

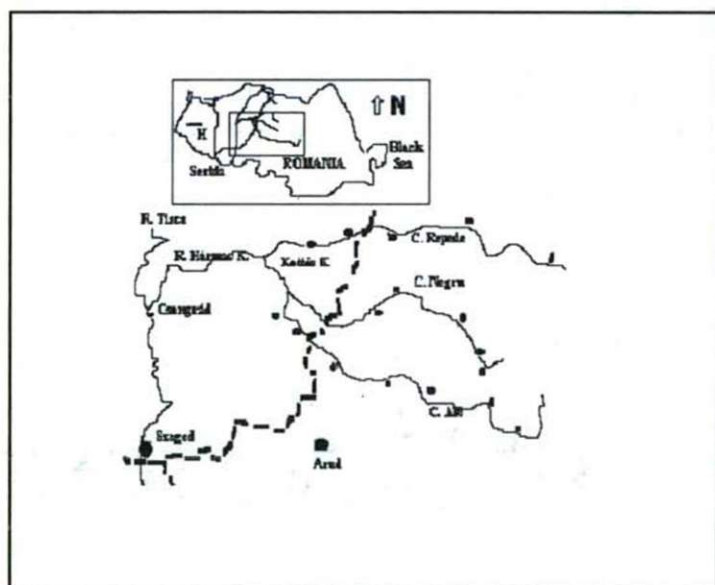


Fig. 1. Sampling places on Criș river system

Qualitative samples were taken from the surface of the stones and gravel pieces by washing into a drifting net in each profiles. Sampling sites were at various distances from the left and the right bank, and when it was possible in the main current as well.

Each sample was washed through a metal screen with a pore mesh size of 250  $\mu\text{m}$  just after collection and preserved in 3-4% formol solution. The retained material was divided into groups of Oligochaetae and Chironomids by a Zeiss stereo microscope in the laboratory, with a four- to sixfold magnification. Animals were preserved in 80% density ethyl alcohol.



For taxonomic identification the following works were used: (Bíró, 1981; Brinkhurst, 1963; Brinkhurst and Jamieson, 1971; Ferencz, 1979; Fittkau, 1962; Fittkau et al. 1983; Hirvenoja, 1973; Pinder et al. 1983; Pop, 1943, 1950; Tshernovskii, 1949).

## Results

### Oligochaeta fauna

#### River Crişul Alb/Fehér-Körös

Specimen density was low in the Spring area. Four *Nais* species were present in the phytotecton on the gravels, covered by a thin layer of filamentous and unicellular algae. The phytophil *Pristina rosea* was dominant there. Low density of the *Nais breitscheri*, *Nais behningi*, and *Nais pseudoptusa* was detected. The diversity was very low there (Fig. 2).

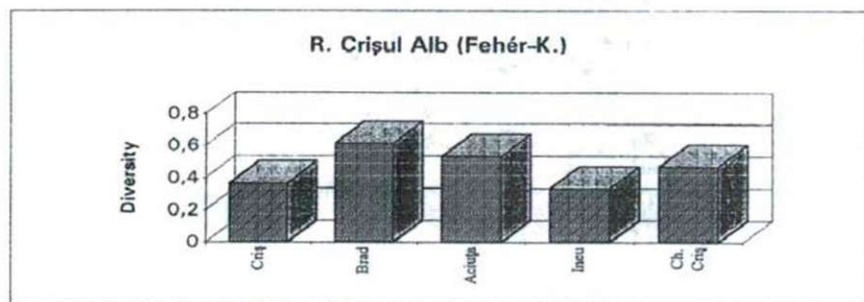


Fig. 2. Diversity of the sediment of the River Crişul Alb by Oligochaeta fauna, as a living resource (Shannon-W. Div. index)

Specimen density increased at Brad. Tubificidae were dominant, especially the *Limnodrilus hoffmeisteri*, a species that was tolerant to harder pollution as well as the *Limnodrilus profundicola* and *Limnodrilus claparedeianus*. Four species of Naididae were present. *Pristina bilobata* was the most frequent, *Nais communis*, *Nais variabilis* and

*Uncinaiis uncinata* were not so common. The number of species, specimen density and the diversity were the highest on this river part.

*Pristina bilobata* was dominant near Ineu, and *Nais behningi* subdominant. They were typical litorheophile species. Sediment accumulation provides suitable conditions for the increase of specimen density of the Tubificidae (lower water speed, rich phytotecton, sediment accumulation). Both the species richness and the biodiversity decreased, but specimen density increased.

The regulation of the river bed was disadvantageous in the Chişineu-Criş area. Both the species number and the specimen density decreased there. The *Nais behningi* was found again, which indicated the upgrade of the water quality.

The total species number of the Oligochaetae was 11 in the River Crişul Alb. *Limnodrilus claparedeianus* and *Pristina bilobata* had the highest specimen density in the mentioned river (Table 1.).

#### River Crişul Negru/Fekete-Körös

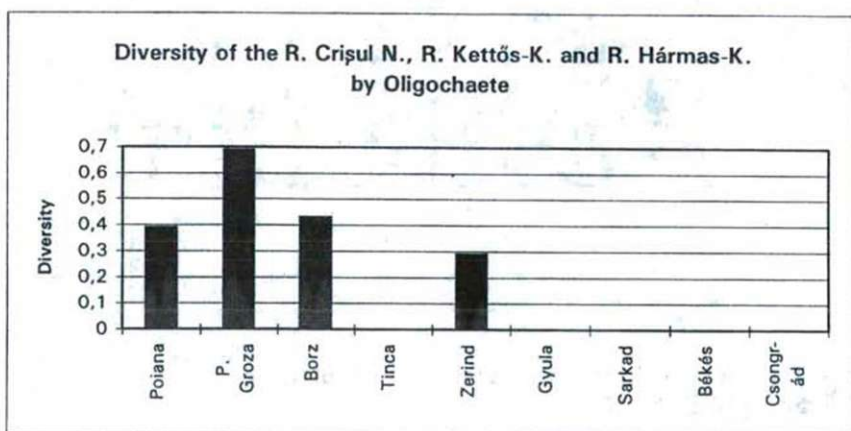


Fig. 3. The diversity of the sediment as a living resource in the River Crişul Negru by the Oligochaeta fauna

16 Oligochaeta species were found here. The *Limnodrilus hoffmeisteri* and the *Nais bretscheri* were the most frequent. Oligochaeta species were not present at sampling sites near Gyula and Sarkad (Hungary). *Limnodrilus hoffmeisteri* was the only Oligochaeta species which was present near Petru Groza, but in low density. *Tubifex nevaensis*

appeared by Borz, which is a characteristic species of clean water, and of water and sediment containing low organic and inorganic materials. Both the above mentioned species were absent at Tinca, but the *Branciura sowerbyi*, which is characteristic an eutroph environment, appeared. This species was present in the River Kettős-Körös by Békés too. *Limnodrilus hoffmeisteri* was found in the Mouth of the River Hármas-Körös by Csongrád (Table 2.).

No correlation was found between the species richness, specimen density and the phosphorus and heavy metal content of the sediment (Table 2., and 4.). The diversity changed between 0.0 and 0.7 (Fig. 3.).

#### River Crișul Repede/Sebes-Körös

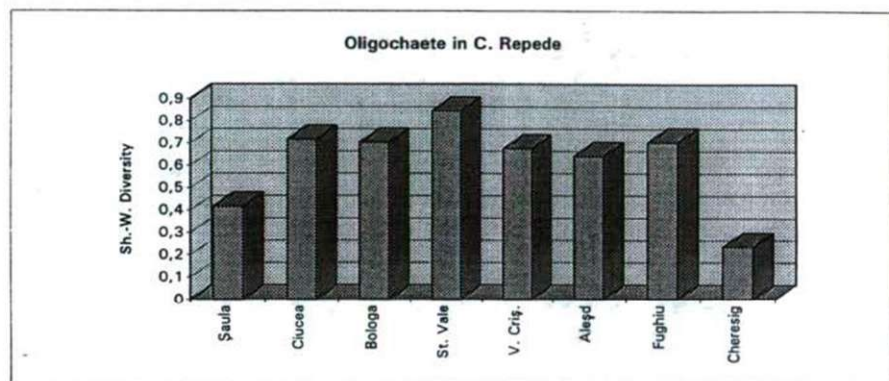


Fig. 4. The quality of the sediment in the River Crișul Repede by the Oligochaeta fauna

Four species of Oligochaetae were present at the source. *Tubifex tubifex* was dominant, and *Limnodrilus hoffmeisteri* the subdominant species. The high density of the *L. hoffmeisteri* showed a similar eutrophic level. 12 species were present by Ciucea.

25 species of the Oligochaetae were present in the sampling time from the Spring to the Mouth area. Species richness varied between 4-12 at the different sampling sites, it was the lowest near Cheresig, and the maximum near Vadul Crișului (Table 3.). The diversity changed between 0.2 and 0.85 (Fig. 4.).



## *Chironomid fauna*

### **Species richness and specimen density**

#### River Crişul Alb/Fehér-Körös

45 species were found from the Spring to the Mouth. Species richness varied between 5-12 in the different sampling sites. *Thienemanniella lentiginosa* was not present near Chişineu-Criş and Gyula, but *Thienemanniella flavescens* was found at the Spring area only. The other species were tolerant to the environmental factors (Table 5).

#### Crişul Negru/Fekete-Körös

49 species represented the Chironomid fauna. Species richness changed between 1-14 on the different sampling sites. *Thienemannimyia lentiginosa* and *Thienemanniella clavicornis* were found at the Spring area and the others were euryoec too and sporadic (Table 6.).

#### River Crişul Repede/Sebes-Körös

64 species represented the Chironomid fauna. Species richness varied between 0-23. Species living in the phytotecton were characteristic at the Spring area and near Aleşd, but species living in the sediment were dominant by Bologa and Ciucea. *Polypedilum scalaenum* was the dominant there, the other species were found mostly only once (Table 7.).

Only 2 species were present in the River Kettős-Körös by Sarkad, the maximum, 11 species, were detected by Békés. Two species were present at the Mouth of the River Hármas-Körös near Csongrád. *Procladius choreus* was dominant in the River Kettős-Körös and R. Hármas-Körös, too. *Macropelopia notata* was dominant and *Procladius choerus* the subdominant, where the sediment was rich in organic materials. The only species which is typical of rivers was *Rheotanytarsus curtistylus*, the others were euryoec and characteristic of still waters (Table 8.).

#### Some tributaries of the Crişul Repede

At the Mouth of the tributaries of the Crişul Repede there were 2-12 species, 31 species altogether. 16 species were present in Drăgan/Dregán Stream, 21 species in Iad/Jád Stream, and 2 species in the Zerna Stream. *Orthocladius thienemanni* was dominant, living in the phytotecton, *Micropsectra praecox* was subdominant, living in the sediment. Most Chironomid species were present only at one sampling site, in low density (Table 9.).

### Dominance and abundance

Regarding the dominance situation, *Psectrocladius barbimanus* was dominant and *Thienemannimyia lentiginosa* subdominant in the River Crişul Alb. The slow water current was indicated by the presence of *Chironomus plumosus* and *Chironomus fluviatilis* there.

Total specimen of more than 50% of the Chironomid were lower than 1% in the R. Crişul Alb, while the rate of total specimen of 14 species varied between 1-6% (Table 10.). Regarding the abundance, *Syndiamesa branickii* and *Eukiefferiella coerulescens* were present in 67% of the samples and they were followed by *Rheocricotopus effusus*, with 56%. Only one sampling site was found with 23 species, in high density, which provided 50% of the species found. The presented Chironomid species were common both in the standing- and in the running waters, but they were very rare in this river (Table 10.).

*Polypedilum scalaenum* (32%) was dominant and *Cryptotendipes anomalus* (19%) was subdominant in the River Crişul Negru. The other species, living in the phytotecton and in the sediment, served as tinctorial elements, because of their low densities and rates, generally under 1% (Table 11.).

*Eukiefferiella similis* and *Paracladopelma camptolabis* were present in 40% of the samples in the R. Crişul Negru. 34 species were present only once in the sediment samples (their abundance was 11%), which was 69% of the Chironomid larvae collected here. Chironomid species in low abundance were common in the standing water and lowland rivers, and they were known as tolerant to the environmental factors (Table 11.).

*Polypedilum scalaenum* was dominant with 32%, and *Cladotanytarsus mancus* subdominant with 16% of the collected Chironomid larvae in the R. Crişul Repede. 16 species of the 64 found in this river represented 1-6% of the Chironomid abundance, and 47 species were detected, which abundance was lower than one per cent. The rate of this species was 73% of the species found in this ecosystem.

No species would reach 50% abundance in this river. Both *Thienemannimyia lentiginosa* and *Corynoneura celeripes* were present with 42% in the samples. The abundance of most species was very low, reached 3% only (Table 12.).

*Orthocladius thienemanni* was found in the tributaries R. Crişul Repede making up 25% of the total number of the Chironomid larvae collected by the inlets. *Micropsectra praecox* was subdominant with 15%. 60% of the collected larvae from the R. Crişul Repede represented the total specimen of 29 species (Table 13.).

### *The diversity of the investigated ecosystems*

The minimum-maximum values by the Chironomid fauna were as follows: the River Crişul Alb: 0.37-0.66; the River Crişul Negru: 0.29-0.56; the River Kettös-Körös:



0.21-0.30; the River Hármas-Körös, sampled at the Mouth only: 0.09-0.21, and the River Crişul Repede; 0.15-0.73.

The affluents of the River Crişul Repede at the Mouth: Drăgan Stream: 0.21-0.49; Iad Stream: 0.39-0.70, and Zerna Stream: 0.17 (Table 12.).

### *Discussion*

#### Oligochaetae

The lack of Oligochaetae was evident at the source area of the River Crişul Alb. Both the quality of the substrate and the narrow food circumstances might be the reason why bloodworms were not able to settle down here. The main cause of high specimen density was probably the organic material content and the quantity of the inorganic phosphorus by Brad, which determined the biomass of the primary production, the main food source of the worms.

Some Oligochaeta species should be present at the sampling site at Almaş. Their absence signals unfavorable environmental conditions, which affected the river part some time earlier too, but the time was not enough yet for the regeneration (Table 1). Despite signals of the pollution by different Oligochaeta species were detected, the condition of the River Crişul Alb was good. The water was cleaner and contained lower food source near Aciuţa than earlier, thanks to selfpurification. Tubificidae were dominant, mainly *Limnodrilus hoffmeisteri*, *Limnodrilus claparedeianus* and *Limnodrilus profundicola*.

The Oligochaeta fauna of the River Crişul Negru was poor too. The presence of the 3 species detected was periodic. Their lack can still be regarded natural at the source area. *Limnodrilus hoffmeisteri*, being the only species present, and especially the lack of *Tubifex nevaensis* might indicate a medium degree inorganic and organic pollution.

The Oligochaeta fauna of the River Crişul Repede can be classified into four families. The families of the Tubificidae and Naididae were the biggest both in species and specimen too. The importance of the Oligochaetae, concerning water (ecosystem) qualification, lies in the fact that the species and specimen richness showed a close correlation with the organic and inorganic material content of the water and sediment. Increasing specimen density showed organic water pollution. The water quality was not determined by the total specimen density correctly, because the ecological demand of the species in different families differed widely. The substrate quality determined the spreading of the species besides the organic matter content of the water and sediment (Sztó et al., 1989, 1993). Naididae preferred the stony and sandy substrate, when the water speed provided sufficient oxygen supply. They were found in high density in the biotecton and among the plants near the banks. Tubificidae preferred the sediment with rich organic material content (detritus

and fitotecton on the sediment surface). This species, living in such environment, were not sensitive for the low oxygen concentrations.

High specimen density of the Oligochaetae was detected both at the Spring area and near Oradea. The main cause was the sedimentation of the communal pollutants. The communal sewage water of Oradea was the main pollution source. Low density of the worms indicated acceptable situations for them at the other sampling sites (Table 3). Naididae were present everywhere with the exception of two, hard polluted sampling sites. They represented high densities by Stâna de Vale and Aleşd, because of the rich phytotecton on the stones. Rapid water current resulted in a thin sedimentation near Aleşd, which was the reason for the low density of the worms.

By comparing the relative abundance of the Tubificidae with the saprobity zones (S), and the values of the saprobity index, water quality can be estimated at the different sampling sites. It follows that the water quality was  $\beta$  mesosaprob between Ciucea and Oradea/Nagyvárad (Fig. 5.).

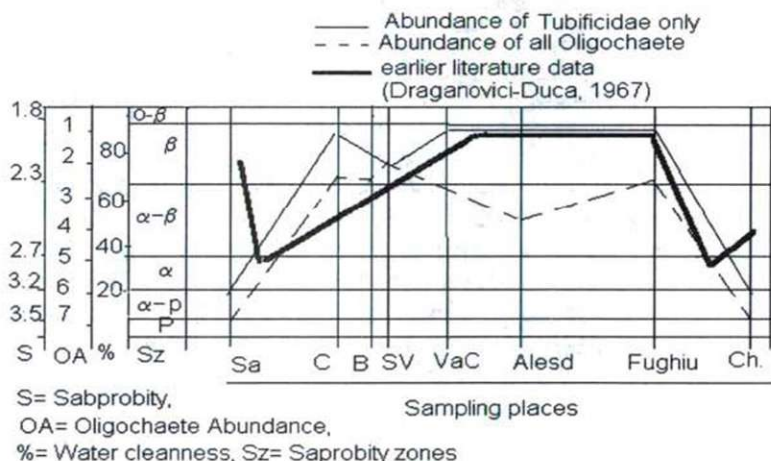


Fig. 5. The quality of the sampling places in the River Crişul Repede by the Tubificids, by the ind. density of the Oligochaete, and by the earlier literature data

Regarding the abundance of the Tubificidae and other Oligochaeta species, we get a saprobity index for all sampling places, presented by the broken line (Fig. 5), which gives us nearly the same abundance of the Tubificidae, but represents a more correct picture. Therefore, Aleşd was in an  $\alpha$ - $\beta$  mesosaprobe zone (Fig. 5). Comparing the course of the



two lines with the data by Draganovici-Duca (1967), the conclusion was that the water quality did not change considerably (Fig. 5).

### Chironomid fauna

A common feature of the River Crișul Alb, the R. Crișul Negru and the R. Crișul Repede is that their water output varies. The flood wave comes down rapidly after rainy days and thaw. Stones and gravels cover the river beds on the upper parts under the shallow water. Because of high transparency the stones, gravels and the sediment surface is covered by phytotecton, which is an advantage for the Chironomid larvae as they live in phytotecton. The flood wave duly wash the Chironomid larvae downstream. Some individuals can find refuge, where they can survive the flood wave and from where they fly up the the river after their larvae have developed into imagos. Females are able to fly several kilometers in search of a suitable site to lay their eggs at. Chironomid species of estuaries (streams) reach the different part of the rivers by the drifting and the flood wave, spreading on this ecological floor continuously.

On the ground of the above presented, we expect that the rivers have a lot of common species mainly on their source and upper stream areas, but we found some such species only on the source area. *Pentapedilum sordens* is the only species present in the investigated rivers. The *Polipedium scalaenum* was absent in the R. Crișul Negru, as well as the *Polipedium minutum* and *Prodiamesa olivacea* on the source areas of the R. Crișul Alb (Table 5-7).

*Thienemannimyia lentiginosa* was the only common species on the lower river part, which was present in three rivers, but not on all sampling sites. The lower water current near the banks is advantageous for it and lives in the phytotecton. We found it in the main current sometimes too, because of the drifting and washing away (Table 5-7).

The upper parts of the rivers were characterized by the absence of the sediment. Chironomid larvae were typical, living in the phytotecton (*Orthocladius*, *Cricotopus*, *Eukiefferiella*). The other species were present where some sediment was found near the banks in still bays (*Cryptochironomus*, *Polipedium* and *Tanytarsus* species).

The middle-course sections of the rivers were shown by *Chironomus*, *Cladopelma*, *Dicrotendipes*, *Tanytarsus*, *Cladotanytarsus* species, living in sediment in both standing- and running waters. These species were mostly phytophagous (algae, bacteria and detritus) and had a large adaptability to extreme environmental factors.

### ***Dominance and abundance***

Water soluble organic and inorganic materials were determining factors in the growing of phytotecton (phosphorus and nitrogen). The rivers were oligotrophic at the upper parts and at the source area. Their enrichment by the effect of food materials



(sawdust and other plant residues) resulted the increase of the trophic level in the rivers. Slowly mineralizing organic materials were continuous food material source for bacteria and algae. Their formation was intensified by the communal-, agricultural- and industrial waste waters which were not, or partly sedimented. The phytotecton serves as rich food source for Chironomid larvae. The shallow water level for some weeks in summer was advantageous for us to study the regenerated Chironomid fauna, and to signalize their specimen density and the species richness after a flood wave.

The presence of the species was definitely mosaic-like in the River Crişul Alb. The low specimen density and the sporadic presence of the tolerant species showed that the river often got pollution effects when the larvae died, and after which the fauna had to start to settle in. The probability of the periodical pollution effects showed the decrease of the specimen density, such the *Thienemannimyia lentiginosa* and other species living in the phytotecton and characteristic of clean water, whereas the increasing of the density of *Psectrocladius barbimanus* was detected (Table 5).

Both the nutrient content and the pollution of the River Crişul Negru were higher than in the Crişul Alb, which was indicated by decreasing of the species richness by Petru Groza, Zerind, Osorhei and Cheresig. The River Crişul Negru was characterized as a very diverse ecosystem by the mosaic-like presence of the tolerant species. The sporadic presence of the species signalized mostly that these species survived the negative environmental effects in refuge (Table 6).

Of the total 64 species we found only 19 (29%) which were present only once. That same rate was 60% in the River Crişul Alb, and in the River Crişul Negru 79%. The "average" diversity index (minimum and maximum values in brackets) were as follows: the River Crişul Alb: 0.52 (0.37-0.65); the River Crişul Negru: 0.40 (0.0-0.64), and the River Crişul Repede: 0.43 (0.19-0.73). The River Crişul Alb showed the highest diversity followed by the River Crişul Repede and the R. Crişul Negru (Table 12).

The collected data showed that the most tolerant species were able to survive the negative environmental effects in the River Crişul Alb and Crişul Negru, by contrast in the River Crişul Repede strong water current is the dominant factor, and that was the reason why both the species richness and the specimen density were low in both R. C. Alb and R. C. Negru. The character species for the clean water and low nutrient content were as follows: *Brilia longifusca*, *Brilia modesta*, *Rheocricotopus effusus*, *Briophaenocladus nitidicollis*, *Chironomus fluviatilis*, *Paralauterborniella nigrohalteralis*, *Thienemannimyia lentiginosa* (Table 5-7).

*Paratendipes intermedius* and *Paratendipes connectens* were absent from the River Crişul Alb and Crişul Negru, while they were present in the River Crişul Repede in sandy sediment on the lowland river part (Table 7). The lack of the above mentioned *Paratendipes* species from the hard polluted Rivers Kettős-Körös and the Hármas-Körös showed the same situation in the Crişul Alb and Crişul Negru too. A significant correlation might be demonstrated between Cadmium (Cd) concentrations and the labium deformities of *Paratendipes* species in the River Tisza (Sztító and Wajand, 1989), when the larvae of the

species could survive the negative effect by concentrations of 20-30 mg/kg of the investigated sediment. The maximum Cd concentration was 7.4 mg/kg of the sediment in the River Crişul Alb, only 25% of the concentration measured in the River Tisza; therefore the absence of the *Paratendipes* species caused by other environmental factors, which have not been identified yet.

### *Conclusions and proposals*

1. The fauna lists present a zero-state, which is not known yet.
2. The specimen density of the Oligochaetae was high on the polluted river parts, *Limnodrilus hoffmeisteri* and *Tubifex tubifex* were characteristic for these river parts.

3. Both the specimen density and species richness increased by the moderated pollution effects (R. Crişul Alb near Brad, R. Crişul Negru near Zerind and R. Crişul Repede by Aleşd). The species richness and the specimen density decreased by hard pollution (River Crişul Repede by Şaula and Cheresig).

4. The River Crişul Alb and R. Crişul Negru had more common Chironomid species, but their abundance was very different. *Cryptochironomus anomalus* was found three times in both rivers, whereas it was only a tinctorial element in the R. Crişul Alb, the rate of its individuals came to 80% of the Chironomid larvae in the R. Crişul Negru by Tinca. *Thienemannimyia lentiginosa* was abundant in the R. Crişul Alb and its rate was only twice under 30%, generally fluctuated between 30-50%. It was found in the River Crişul Negru twice only (Poiana and Petru Groza). *Polypedilum convictum* showed a similar picture too.

The standing water and low water current with rich nutrient was optimal for *Cladotanytarsus mancus*. The River Crişul Negru showed a characteristic pollution from Zerind.

The larvae of the *Cryptochironomus redekei* were in low specimen density, while the species was subdominant in River Crişul Negru.

5. *Procladius olivaceus* and *Orthocladius saxicola* species were present on the Spring area, but *Cladotanytarsus mancus* was characteristic for the middle and the lowland parts of the River Crişul Repede. *Polypedilum scalaenum* was present from the Spring to the Mouth on the different sampling places.

6. *Orthocladius thienemanni*, *Thienemannimyia lentiginosa* and *Paratendipes intermedius* were known as characteristic species for the clean river ecosystems. The presence of the *Polypedilum* sp. was characteristic for the ecosystems, which were rich in nutrients.

7. Despite more than half of the Chironomid species were detected in one sample only, the presented species cannot be classified as rare or threatened, because of lack of earlier faunistic investigations.



Table 1. Quantitative data of the Oligochaete in the River Fehér-Körös (Crişul Alb)

No.	Species	Sampling places				
		Criş	Brad	Aciuja	Ineu	Ch. Criş
		ind./m <sup>2</sup>				
1	<i>Limnodrilus claparedeianus</i>		171	302	3006	40
2	<i>Limnodrilus hoffmeisteri</i>		2313	845	306	
3	<i>Limnodrilus profundicola</i>		428	181	982	30
4	<i>Nais behningi</i>	33		20		30
5	<i>Nais bretscheri</i>	33				
6	<i>Nais communis</i>		386			
7	<i>Nais pseudoptusa</i>	16				
8	<i>Nais variabilis</i>		214			
9	<i>Pristina bilobata</i>		686	241		
10	<i>Pristina rosea</i>	230				
11	<i>Uncinaiis uncinata</i>		86			
	Total ind./m <sup>2</sup>	312	4284	1589	4294	100
	Species number	4	7	5	3	3



Table 2. Species and quantitative data of the Oligochaete in the R. Fekete Körös (Crisul Negru),  
R. Kettos K. and R. Hármas K. (August 10-17, 1994)

		Sampling places								
No.	Species	Poiana	Petru Groza	Borz	Tinca	Zetind	Gyula	Sarkad	Bekes	Csongrad
		ind./m2								
1	<i>Branchiura sowerbyi</i>				59				59	
2	<i>Eiseniella tetraedra</i>	200		51						
3	<i>Limnodrilus claparedeianus</i>		401							
4	<i>Limnodrilus hoffmeisteri</i>		987	89		182				44
5	<i>Nais barbata</i>		219							
6	<i>Nais behningi</i>	111				557				
7	<i>Nais bretscheri</i>		619	666		10				
8	<i>Nais communis</i>	22								
9	<i>Nais pseudoptusa</i>	1671								
10	<i>Pristina aequisetata</i>					10				
11	<i>Pristina bilobata</i>			1516						
12	<i>Pristina rosea</i>	355								
13	<i>Tubifex nevaensis</i>			44						
14	<i>Tubifex tubifex</i>		474							
15	<i>Uncinaiis uncinata</i>		109							
16	<i>Vejdovskiiella comata</i>			333						
	Total (ind./m2)	2359	2809	2699	59	759	0	0	59	44
	Species number	5	6	6	1	4	0	0	1	1

Table 3. Oligochaete and their quantity in Crişul Repede (Sebes-Körös)

No.	Species	Sampling places							
		Şaula	Ciuca	Bologa	Stâna de Vale	Vadul Crişului	Aleşd	Fughiu	Cheresig
		ind./m <sup>2</sup>							
1	<i>Aulodrilus pigueti</i>							7	
2	<i>Aulodrilus pluriset</i>		2			13			
3	<i>Branchiura sewerby</i>							3	
4	<i>Eiseniella tetraedra</i>				15		13		
5	<i>Limnodrilus elaparedeianus</i>	328				6			266
6	<i>Limnodrilus hoffmeisteri</i>	3443	56	561			12	17	5665
7	<i>Limnodrilus profundicola</i>	11							
8	<i>Limnodrilus udekemianus</i>	439		27					54
9	<i>Nais barbata</i>		4	617	325	7	73		
10	<i>Nais behningi</i>				104	16	119		
11	<i>Nais brotscheri</i>		138	802	207	312	1295		
12	<i>Nais communis</i>		274	3995	380	86	123	20	
13	<i>Nais elinguis</i>		8	1644	147	23	53		
14	<i>Nais pardalis</i>			80	484	19	377	3	
15	<i>Nais pseudoptusa</i>		30		573	73	103		
16	<i>Nais variabilis</i>						3		
17	<i>Ophiodonair serpentina</i>			107	70	7		51	
18	<i>Pristina aquiseta</i>		14	27			10		
19	<i>Pristina bilobata</i>		8			6	17	7	
20	<i>Pristina rosea</i>		16	3013			3		
21	<i>Rhyncheimys sp.</i>				35				
22	<i>Stylaria lacustris</i>						12	88	
23	<i>Stylodrilus heringianus</i>	14							
24	<i>Tubifex tubifex</i>	859	6	53		13	46	3	742
25	<i>Veidowskyella comata</i>							3	
	Total ind./m <sup>2</sup>	5094	64	641	50	32	71	27	6727

Table 4. Sediment chemical data of R. Crişul Alb (Fehér-K.) and R. Crişul Negru (Fekete-K.)

Components (total)	Unit (dry mat.)	Sampling places													
		Crişul Alb							Crişul Negru					R. Kettős-K.	R. Hármas-K.
		Criş	Brad	Talagiu	Almaş	Ineu	Ch. Criş	Gyula	Source	P. Groza	Tinca	Borz	near border	Békés	Inflow
Fe	g/kg	23,53	36,37	27,29	9,69	19,61	8,44	17,02	12,65	9,60	24,65	8,94	18,92	24,74	19,20
Mn	mg/kg	439,05	1995,40	1768,50	224,60	678,20	337,10	675,30	411,40	285,20	519,10	236,20	616,10	802,80	617,10
Kjeldahl -N	g/kg	2,72	2,85	2,69	0,13	3,55	0,29	0,54	1,70	0,71	0,63	0,21	1,25	1,57	0,99
P	g/kg	0,48	1,05	0,72	0,30	0,60	0,19	0,36	0,36	0,21	0,39	0,30	0,48	0,65	0,63
Cd	mg/kg	0,00	7,40	2,40	0,00	4,80	0,70	0,70	0,50	0,40	1,60	0,00	0,50	0,90	0,50
Ni	mg/kg	44,90	52,80	28,80	10,30	24,90	8,40	20,50	15,20	10,60	29,60	10,40	19,30	30,00	24,80
Zn	mg/kg	89,30	1139,20	307,00	42,40	328,10	59,50	107,20	69,80	37,80	242,60	23,40	75,80	137,00	116,40
Pb	mg/kg	25,30	79,90	63,00	13,50	116,10	28,00	35,60	35,00	21,00	58,70	8,80	98,20	43,00	29,80
Cr	mg/kg	17,30	38,20	22,90	4,50	13,50	7,20	12,70	11,50	6,90	16,80	5,50	13,70	24,50	23,50
Cu	mg/kg	41,10	377,90	126,20	6,00	117,20	23,40	26,00	27,00	12,50	50,30	5,30	24,60	50,90	27,90



Table 5. Chironomid fauna of the R. Crişul Alb (Fehér-Körös)

Species	Spring area	Brad			Ch. Criş	Acuiş	Ineu	Gyula	
	main current	near the bank fresh alder leaves in water		navy holes	river bed				
			ind./m <sup>2</sup>						
1. <i>Brillia longifusca</i> K.		8	19						
2. <i>Chironomus fluviatilis</i> Lenz				11					
3. <i>Chironomus plumosus</i> Linnaeus			8	4					
4. <i>Cladopelma laccophila</i> K.			19					11	
5. <i>Cladotanytarsus mancus</i> Walk.	4				4				
6. <i>Conchapelopia pallidula</i> Mg.			4	15					
7. <i>Cricotopus sylvestris</i> Fabr.								8	
8. <i>Cryptochironomus defectus</i> K.			49						
9. <i>Cryptochironomus redekei</i> Krus.	4		38			23	15		
10. <i>Cryptotendipes anomalus</i> K.			57				4	4	
11. <i>Dicoretendipes nervosus</i> Staeg.								19	
12. <i>Dicoretendipes pulsus</i> Walk.								8	
13. <i>Dicoretendipes tritonus</i> K.							4		
14. <i>Einfeldia insolita</i> K.			4						
15. <i>Einfeldia pectoralis</i> K.	4		4						
16. <i>Endochironomus intextus</i> Walk.		11							
17. <i>Eukiefferiella coerulescens</i> K.					4				
18. <i>Krenopelopia binotata</i> Wied.							4		
19. <i>Limnophies prolongatus</i> K.		15							
20. <i>Macropelopia nebulosa</i> Mg.	4							42	
21. <i>Microsetra praecox</i> Mg.	110	8					8		
22. <i>Microsetra trivialis</i> K.								8	
23. <i>Microtendipes chloris</i> Mg.						4	4		
24. <i>Orthocladus olivaceus</i> K.	11								
25. <i>Orthocladus saxicola</i> K.			4		8		19		
26. <i>Parachironomus arcuatus</i> Goetgh.			23						
27. <i>Parachironomus monochromus</i> v.d. Wulp								11	
28. <i>Parakiefferiella bathophila</i> K.						19			
29. <i>Paralauterborniella nigrohalteralis</i> Mall.							4		
30. <i>Paratanytarsus lauterborni</i> K.	4	4		4			8		
31. <i>Pentapedilum sordens</i> v. d. Wulp	4	8	34	30					
32. <i>Polypedilum minutum</i> Krug.			15	0	34	11	23		
33. <i>Polypedilum nubeculosum</i> Mg.		4	4	23				11	
34. <i>Polypedilum nubifer</i> Skuse			8						
35. <i>Polypedilum scalaenum</i> Schr.	11	15		64			4	4	
36. <i>Procladius choreus</i> Mg.		4	15						
37. <i>Psectrocladius barbimanus</i> Edw.				446		4			
38. <i>Rheocricotopus effusus</i> Walk.		8							
39. <i>Robackia demeijerei</i> Krus.					8				
40. <i>Syndiamesa branickii</i> Now.		4							
41. <i>Tanytus punctipennis</i> Mg.			19						
42. <i>Tanytarsus curticornis</i> K.	8		8	11		4	4	11	
43. <i>Tanytarsus gregarius</i> K.						4			
44. <i>Thienemanniella flavescens</i> Edw.		4							
45. <i>Thienemanniella lentiginosa</i> Fries	79	38	132	4		87	42		
Total ind./m <sup>2</sup>	242	117	144	408	646	34	178	106	
Species richness	11	12	6	15	10	5	10	10	

Table 6. Chironomid fauna in the R. Crișul Negru (Fekete-Körös)

Table 6. Chironomids found in the R. Crișul Negru (Făcete-Roșos)									
	Potama	Petr. Groza	Borș	Timca	Zetind	Sarkad			
Species	bank	gravels	sandy sediment	gravels	gravels	sediment	sediment	phytotecton	clay sediment
1. <i>Arctoptoplia</i> sp.	4								
2. <i>Brillia longifascia</i> K.		8							
3. <i>Brillia modesta</i> Mg.		4							
4. <i>Brachymerocladus nitidicollis</i> Goetgh.		4							
5. <i>Chironomus luvianilis</i> Lenz					15				
6. <i>Chironomus riparius</i> Mg.					8				
7. <i>Cladotanytarsus manicus</i> Weik.							11	19	
8. <i>Conchopelopia pallidula</i> Mg.									
9. <i>Cricotopus bicusculus</i> Mg.					4				
10. <i>Cricotopus trifascia</i> Edw.				4					
11. <i>Cryptochironomus redhekei</i> Krus.					4				
12. <i>Cryptotendipes anomulus</i> K.					4	249			
13. <i>Demicryptochironomus vulneratus</i> Zeit.		19				4			
14. <i>Dicrotendipes nervosus</i> Sloeg.				8					
15. <i>Eukiefferellia longicauda</i> K.				8					
16. <i>Eukiefferellia similis</i> Goetgh.				8					
17. <i>Eukiefferellia thernovskii</i> Pont.			106						
18. <i>Limnophyes pusillus</i> Eaton		4							
19. <i>Macropelopia nebulosa</i> Mg.	4								4
20. <i>Merocnemus hygropericus</i> K.		8							
21. <i>Micropeetra proteox</i> Mg.		4							
22. <i>Micropeetra privata</i> K.	23								
23. <i>Microtendipes chloris</i> Mg.							4		
24. <i>Microtendipes pedellus</i> de Geer				23			15		
25. <i>Orthocladus olivaceus</i> K.				15					
26. <i>Orthocladus saxicola</i> K.									
27. <i>Paraclopheta campolobis</i> K.			4			4			4
28. <i>Parakiefferellia bathophila</i> K.									
29. <i>Paratanytarsus nigrobollensis</i> Meil.				4	8	4	8		
30. <i>Paratanytarsus luterborni</i> K.				8					
31. <i>Pentapetillum sordens</i> v. d. Wulp		34	11		4				
32. <i>Polyapetillum minutum</i> Krug.		113	42			34		12	
33. <i>Polyapetillum rubeculosum</i> Mg.		634	8						
34. <i>Polyapetillum scalareum</i> Schr.							53		
35. <i>Potharitia longimana</i> K.		4							
36. <i>Procladius choreus</i> Mg.		23			4	8			
37. <i>Procladius olivacea</i> Mg.		87				4			
38. <i>Procladius domibialis</i> Bonnerinc et Albu			11						
39. <i>Procladius morio</i> Zeit.		8							
40. <i>Psectrocladius burdianus</i> Edw.			19						
41. <i>Psectrocladius semivivans</i> K.		8					11		
42. <i>Tanytarsus punctipennis</i> Mg.					4				
43. <i>Tanytarsus orichensis</i> Goetgh.						4			
44. <i>Tanytarsus curticornis</i> K.	4			4			15		
45. <i>Tanytarsus gracillimus</i> Hölmg.									
46. <i>Tanytarsus gregarius</i> K.		8			4				
47. <i>Thienemannella clavicornis</i> K.		4							
48. <i>Thienemannella leniglossa</i> Fries		102	110						
49. <i>Trisoptelopia longimana</i> Sloeg.	4								
Total ind./m <sup>2</sup>	1042	238	4	211	162	317	15	38	8
Species richness	14	13	1	12	14	10	2	3	2



Table 7. Chironomid fauna of the R. Crișul Repede (R. Sebes-Körös) - 1995.

Species	Spring area		Aiead		Bologna		Civota below		Osohei before		Fuglu		Cheresig		Szeghalom											
	bank	main current	bank	2 m from the bank	bank	20 m from the bank	bank	2 m from the bank	main current	right bank	main current	left bank	2 m from the bank	bank side	bank side	scallo 6 m	main current	8 m from the bank	2 m from the bank	bank side	main current	bank side	2 m from the bank	main current	main current	2 m from the bank
Sampling places	Ind./m <sup>2</sup>																									
1. <i>Aspsectrotanytus trifascipennis</i> Zett.																			15							
2. <i>Camplochironomus tentans</i> Fabr.																4				0	15					
3. <i>Cardiocladius fuscus</i> K.																										
4. <i>Chironomus fluviatilis</i> Lenz																23			140	8				4		
5. <i>Chironomus riparius</i> Mg.												4							8	15						
6. <i>Cladopelma lacophila</i> K.																										4
7. <i>Cladotanytarsus mancus</i> Walk.			155		465	41				4	4		8	4	4		4	26						34		
8. <i>Clinotanytus nervosus</i> Mg.																										
9. <i>Corynoneura celeripes</i> Win.	8																4									
10. <i>Corynoneura lemnae</i> Frauenfeld																				4						
11. <i>Cricotopus albiforceps</i> K.																			4							
12. <i>Cricotopus algarum</i> K.		4	8	4															4		8					
13. <i>Cricotopus annulator</i> Goetgh.		8																								
14. <i>Cricotopus bicornis</i> Mg.														11												
15. <i>Cricotopus fuscus</i> K.																			8							
16. <i>Cricotopus sylvesteris</i> Fabr.																			4							
17. <i>Cricotopus tremulus</i> Linnaeus		8																								
18. <i>Cricotopus trifasciatus</i> Edw.	15	15		8							4								26							
19. <i>Cryptochironomus redekii</i> Krus.			38		72	15				4	4					8	11	15	4				45	23	49	
20. <i>Cryptotendipes anomalous</i> K.																4								4		
21. <i>Demicyptochironomus vulneratus</i> Zett.									11																	
22. <i>Dicrotendipes nervosus</i> Staeg.																			11		11			8	72	
23. <i>Dicrotendipes tritonus</i> K.															8	11		125				4	4			
24. <i>Einfeldia pectoralis</i> K.											4															
25. <i>Eukiefferiella brevicornis</i> K.															8											
26. <i>Eukiefferiella quadridentata</i> Tshern.	19																									
27. <i>Eukiefferiella tshernovskii</i> Pankr.	8																									
28. <i>Glyptotendipes caulinervis</i> K.			4																							
29. <i>Kiefferulus tendipediformis</i> Goetgh.																			4							
30. <i>Lenzia flavipes</i> Mg.																4										
31. <i>Limnophyes prolongatus</i> K.								15																		
32. <i>Limnophyes pusillus</i> Eaton		8																								
33. <i>Macropelopia nebulosa</i> Mg.																		4	30	15						
34. <i>Metriocnemus hygroptericus</i> K.			4																							
35. <i>Microspectra praecox</i> Mg.				4				8				4			11				19	4	4		4	4		
36. <i>Microtendipes chloris</i> Mg.												8		4					11							
37. <i>Nanocladius bicolor</i> Zett.																	4		4							
38. <i>Orthocladius saxicola</i> K.	11	90		11						4		4	11	8		4	4	11	19					19		
39. <i>Orthocladius thienemanni</i> K.	23	4	11	38		8						11				4		15	8				11			
40. <i>Parachironomus arcuatus</i> Goetgh.																			4							
41. <i>Paracletidius conversus</i> Walk.																				83						
42. <i>Paracletidius campolabis</i> K.			8		11																		8			
43. <i>Paracletidius rolii</i> Kirp.																										8
44. <i>Parakiefferiella bathophila</i> K.				5																						
45. <i>Paratendipes intermedius</i> Tsh.											4			4	4				19							
46. <i>Paratendipes connexens</i> Lipina												4														
47. <i>Pentapedium sordens</i> v. d. Wulp	4		11	8						15		11	19						30	8						
48. <i>Polypedium minutum</i> Krug.												4	4	4		4	4	4								
49. <i>Polypedium nubeculosum</i> Mg.				4		8									4			15	4				4	8		4
50. <i>Polypedium scalanum</i> Schr.	26	4					4			4	4	196	15	11	8	64	8	45	98		83	242	128	491		30
51. <i>Potthastia gaei</i> Mg.																				26						
52. <i>Procladius choreus</i> Mg.			11	26										8					4							
53. <i>Procladius conversus</i> Walk.																			4							
54. <i>Procladius olivacea</i> Mg.	4																			79						
55. <i>Psectrocladius barbimanus</i> Edw.							4																			
56. <i>Psectrocladius dilatatus</i> v. d. Wulp	125			4															4	4			8			
57. <i>Symptotendipes lignicola</i> K.																				15						
58. <i>Tanytarsus punctipennis</i> Mg.																										
59. <i>Tanytarsus curvicauda</i> K.																								8	4	
60. <i>Tanytarsus gracilentus</i> Holmgr.	19																									
61. <i>Tanytarsus gregarius</i> K.							4						4	42	4		15	19								
62. <i>Thienemanniella vittata</i> Edw.								4	4						4											
63. <i>Thienemanniella lentiginosa</i> Fries										11			8	4				4	4		4	4		4	4	
64. <i>Trisociolus fluviatilis</i> Goetgh.																										
Total ind./m <sup>2</sup>	261	139	253	81	585	68	0	11	76	11	42	227	51	125	57	147	30	15	536	332	208	98	291	215	680	45
Species richness	11	8	10	8	6	4	0	3	5	3	6	8	7	10	11	13	5	4	22	17	11	4	3	13	8	



Table 8. Individual density and species richness  
of the Chironomids in the Körös River System

Rivers	R. Kettös-Körös			R. Hármas-Körös	
sampling places	Sarkad	Békés		Csongrád	
Species	bank	bank	qualitative	bank	main current
1. <i>Cladotanytarsus mancus</i> Walk.			11		
2. <i>Cryptochironomus redekei</i> Krus.		8			
3. <i>Cryptotendipes anomalus</i> K.			8		
4. <i>Dicrotendipes nervosus</i> Staeg.		4			
5. <i>Dicrotendipes pulsus</i> Walk.				4	
6. <i>Dicrotendipes tritonus</i> K.			4		
7. <i>Einfeldia carbonaria</i> Mg.			4		
8. <i>Macropelopia nebulosa</i>	4				
9. <i>Macropelopia notata</i> Mg.			72		
10. <i>Micropsectra praecox</i> Mg.			11		
11. <i>Paracladopelma camptolabis</i>	4				
12. <i>Polypedilum nubeculosum</i> Mg.		4			
13. <i>Procladius choreus</i> Mg.			19	4	
14. <i>Rheotanytarsus curtistylus</i> Goetgh.			15		
Total ind./m <sup>2</sup>	8	15	144	8	0
Species richness	2	3	8	2	0

Table 9. Tributaries of the R. Crişul Repede, Chironomid fauna (ind/m2)- 1995.

Species	H. St. Vale	Drăgan Stream				Iad Stream			Zarna Stream	
	near the bank	near the bank	gravel	near the bank	main current	2 m from the bank	main current	near the bank	near the bank	
1. <i>Ablabesmyia monilis</i> Linnaeus							8			
2. <i>Cladotanytarsus mancus</i> Walk.						4	1			
3. <i>Clinotanytus nervosus</i> Mg.		4								
4. <i>Cricotopus fuscus</i> K.							4			
5. <i>Eukiefferiella brevicar</i> K.							49			
6. <i>Eukiefferiella clypeata</i> K.								15		
7. <i>Eukiefferiella tshernovskii</i> Pankr.						8				
8. <i>Krenopelopia binotata</i> Wied.							8			
9. <i>Lenzia flavipes</i> Mg.					4					
10. <i>Limnophies hydrophilus</i> Goetgh.	4									
11. <i>Limnophies pusillus</i> Eaton							8			
12. <i>Macropelopia nebulosa</i> Mg.						4	4	8		
13. <i>Microspectra praecox</i> Mg.	94					8	8	4		
14. <i>Microtendipes chloris</i> Mg.				4						
15. <i>Nanocladius bicolor</i> Zett.	11									
16. <i>Orthocladius saxicola</i> K.	19	4				15	11	8	11	
17. <i>Orthocladius thienemanni</i> K.	30					113	26	23		
18. <i>Paracladopelma camptolabis</i> K.	4									
19. <i>Paratendipes intermedius</i> Tsh.					4					
20. <i>Pentapedilum sordens</i> v. d. Wulp	15	4			4			11		4
21. <i>Polypedilum minutum</i> Krug.								4		
22. <i>Polypedilum nubeculosum</i> Mg.					4			4		
23. <i>Polypedilum scalaenum</i> Schr.				4	4					
24. <i>Procladius olivacea</i> Mg.				11	15			11		11
25. <i>Psectrocladius barbimanus</i> Edw.		4	4							
26. <i>Psectrocladius dilatatus</i> v. d. Wulp						23		15		
27. <i>Psectrocladius simulans</i> Joh.							19			
28. <i>Tanytarsus curticornis</i> K.								4		
29. <i>Tanytarsus gregarius</i> K.	4					4				
30. <i>Thienemanimyia lentiginosa</i> Fries	11					15		8		
31. <i>Trissopelopia longimana</i> Staeg.							4			
Total ind. /m2	193	12	8	19	34	34	179	136	117	15
Species richness	9	3	2	3	6	5	7	10	12	2

Table 10. Chironomid species abundance and dominance in the R. Crişul Alb (Fehér-Körös)

Species	Dominance	Abundance
	%	%
<i>Psectrocladius barbimanus</i> Edw.	22,370499	22,222222
<i>Thienemannimyia lentiginosa</i> Fries	18,986726	11,111111
<i>Micropsectra praecox</i> Mg.	6,2035839	22,222222
<i>Polypedilum scalaenum</i> Schr.	4,8876721	22,222222
<i>Polypedilum minutum</i> Krug.	4,1342293	22,222222
<i>Cryptochironomus redekei</i> Krus.	3,9477352	22,222222
<i>Pentapedilum sordens</i> v. d. Wulp	3,7597478	11,111111
<i>Cryptotendipes anomalus</i> K.	3,1957856	11,111111
<i>Cryptochironomus defectus</i> K.	2,4438361	44,444444
<i>Tanytarsus curticornis</i> K.	2,2558487	33,333333
<i>Macropelopia nebulosa</i> Mg.	2,2558487	22,222222
<i>Polypedilum nubeculosum</i> Mg.	2,0678613	11,111111
<i>Cladopelma laccophila</i> K.	1,5038991	11,111111
<i>Orthocladius saxicola</i> K.	1,5029036	11,111111
<i>Brillia longifusca</i> K.	1,32	22,222222
<i>Parachironomus arcuatus</i> Goetgh.	1,1279243	11,111111
<i>Conchapelopia pallidula</i> Mg.	0,939937	11,111111
<i>Dicrotendipes nervosus</i> Staeg.	0,939937	11,111111
<i>Parakiefferiella bathophila</i> K.	0,939937	11,111111
<i>Paratanytarsus lauterborni</i> K.	0,939937	22,222222
<i>Procladius choreus</i> Mg.	0,939937	33,333333
<i>Tanytus punctipennis</i> Mg.	0,939937	11,111111
<i>Limnophies prolongatus</i> K.	0,7519496	22,222222
<i>Chironomus fluviatilis</i> Lenz	0,5639622	11,111111
<i>Endochironomus intextus</i> Walk.	0,5639622	33,333333
<i>Orthocladius olivaceus</i> K.	0,5639622	11,111111
<i>Parachironomus monochromus</i> v.d. Wulp	0,5639622	11,111111
<i>Chironomus plumosus</i> Linnaeus	0,5639622	11,111111
<i>Cricotopus sylvestris</i> Fabr.	0,3759748	11,111111
<i>Dicrotendipes pulsus</i> Walk.	0,3759748	44,444444
<i>Einfeldia pectoralis</i> K.	0,3759748	44,444444
<i>Micropsectra trivialis</i> K.	0,3759748	44,444444
<i>Microtendipes chloris</i> Mg.	0,3759748	44,444444
<i>Polypedilum nubifer</i> Skuse	0,3759748	11,111111
<i>Rheocricotopus effusus</i> Walk.	0,3759748	55,555556
<i>Cladotanytarsus mancus</i> Walk.	0,375477	22,222222
<i>Robackia demeijerei</i> Krus.	0,3749793	22,222222
<i>Dicrotendipes tritonus</i> K.	0,1879874	11,111111
<i>Einfeldia insolita</i> K.	0,1879874	11,111111
<i>Krenopelopia binotata</i> Wied.	0,1879874	11,111111
<i>Paralauterborniella nigrohalteralis</i> Mall.	0,1879874	11,111111
<i>Syndiamesa branickii</i> Now.	0,1879874	66,666667
<i>Tanytarsus gregarius</i> K.	0,1879874	11,111111
<i>Thienemanniella flavescens</i> Edw.	0,1879874	11,111111
<i>Eukiefferiella coerulescens</i> K.	0,1874896	66,666667
	100,00481	100



Table 11. Chironomid species abundance and dominance in the R. Crişul Negru (Fekete-Körös)

Species	Dominance %	Abundance %
<i>Polypedium nubeculosum</i> Mg.	31,53	11,11
<i>Cryptotendipes anomalus</i> K.	12,43	11,11
<i>Thienemannimyia lentiginosa</i> Fries	10,39	11,11
<i>Polypedium minutum</i> Krug.	9,86	11,11
<i>Eukiefferiella tshernovekii</i> Pankr.	5,19	11,11
<i>Procladius olivacea</i> Mg.	4,45	11,11
<i>Polypedium scalaenum</i> Schr.	2,60	22,22
<i>Pentapedium sordens</i> v. d. Wulp	2,41	11,11
<i>Procladius choreus</i> Mg.	1,67	11,11
<i>Cladotanytarsus mancus</i> Walk.	1,48	11,11
<i>Micropsectra trivialis</i> K.	1,11	22,22
<i>Orthocladus olivaceus</i> K.	1,11	22,22
<i>Paralauterhorniella nigrohalteralis</i> Mall.	1,11	11,11
<i>Demicryptochironomus vulneratus</i> Zett.	0,93	11,11
<i>Psectrocladius barbimanus</i> Edw.	0,93	11,11
<i>Chironomus fluviatilis</i> Lenz	0,74	11,11
<i>Conchapelopia pallidula</i> Mg.	0,74	11,11
<i>Microtendipes pedellus</i> de Geer	0,74	11,11
<i>Orthocladus saxicola</i> K.	0,74	22,22
<i>Tanytarsus punctipennis</i> Mg.	0,74	11,11
<i>Tanytarsus gracilentus</i> Holmgr.	0,74	11,11
<i>Procladius danubialis</i> Botnariuc et Albu	0,56	11,11
<i>Tanytarsus curticornis</i> K.	0,56	11,11
<i>Tanytarsus gregarius</i> K.	0,56	11,11
<i>Brillia longifusca</i> K.	0,37	11,11
<i>Chironomus riparius</i> Mg.	0,37	11,11
<i>Cryptochironomus redekei</i> Krus.	0,37	22,22
<i>Eukiefferiella longicalcar</i> K.	0,37	11,11
<i>Eukiefferiella similis</i> Goetgh.	0,37	44,44
<i>Macropelopia nebulosa</i> Mg.	0,37	11,11
<i>Metriocnemus hygroptericus</i> K.	0,37	33,33
<i>Paracladopelma campolabris</i> K.	0,37	44,44
<i>Paratanytarsus lauterborni</i> K.	0,37	22,22
<i>Protanypus morio</i> Zett.	0,37	11,11
<i>Synorthocladus semivirens</i> K.	0,37	11,11
<i>Trissopelopia longimana</i> Staeg.	0,19	33,33
<i>Arctopelopia</i> sp.	0,19	22,22
<i>Brillia modesta</i> Mg.	0,19	11,11
<i>Briophaenocladus nitidicollis</i> Goetgh.	0,19	11,11
<i>Cricotopus bicinctus</i> Mg.	0,19	11,11
<i>Cricotopus trifascia</i> Edw.	0,19	11,11
<i>Dicrotendipes nervosus</i> Staeg.	0,19	22,22
<i>Limnophyes pusillus</i> Eaton	0,19	11,11
<i>Micropsectra praecox</i> Mg.	0,19	33,33
<i>Microtendipes chloris</i> Mg.	0,19	11,11
<i>Parakiefferiella hathophila</i> K.	0,19	22,22
<i>Pothastia longimana</i> K.	0,19	11,11
<i>Tanytarsus arduensis</i> Goetgh.	0,19	22,22
<i>Thienemanniella clavicornis</i> K.	0,19	11,11

Table 12. Abundance and dominance of the Chironomid species in the R. Crişul Repede/Sebes-Körös - 1995.

Species	Dominance %	Abundance %
<i>Polypedium scalaenum</i> Schr.	31,87	3,85
<i>Cladotanytarsus manicus</i> Walk.	16,30	3,85
<i>Cryptochironomus redekei</i> Krus.	6,26	7,69
<i>Orthocladius saxicola</i> K.	4,19	15,38
<i>Chironomus fluviatilis</i> Lenz	3,79	11,54
<i>Dicoretendipes tritonus</i> K.	3,29	3,85
<i>Psectrocladius dilatatus</i> v. d. Wulp	3,13	42,31
<i>Orthocladius thienemanni</i> K.	2,88	3,85
<i>Pentapedilum sordens</i> v. d. Wulp	2,32	3,85
<i>Dicoretendipes nervosus</i> Støeg.	2,22	3,85
<i>Tanytarsus gregarius</i> K.	1,89	3,85
<i>Procladius olivaceus</i> Mg.	1,81	19,23
<i>Paraccladius conversus</i> Walk.	1,81	3,85
<i>Cricotopus trifasciatus</i> Edw.	1,48	3,85
<i>Micropsectra praecox</i> Mg.	1,32	3,85
<i>Macropelopia nebulosa</i> Mg.	1,07	3,85
<i>Polypedium nubeculosum</i> Mg.	1,07	3,85
<i>Procladius choreus</i> Mg.	1,07	19,23
<i>Thienemanniella lentiginosa</i> Fries	0,99	46,15
<i>Trissocladius fluviatilis</i> Goetgh.	0,82	7,69
<i>Paraccladius campolabris</i> K.	0,74	3,85
<i>Paratendipes intermedius</i> Tsh.	0,66	15,38
<i>Polypedium minutum</i> Krug.	0,58	19,23
<i>Pothastia goedi</i> Mg.	0,58	3,85
<i>Chironomus riparius</i> Mg.	0,58	3,85
<i>Cricotopus algarum</i> K.	0,58	3,85
<i>Microtendipes chloris</i> Mg.	0,49	3,85
<i>Eukiefferiella quadridentata</i> Tshern.	0,41	3,85
<i>Tanytarsus gracilentus</i> Holmgr.	0,41	3,85
<i>Assectrotanytarsus trifasciatus</i> Zett.	0,33	3,85
<i>Cardiocladius fuscus</i> K.	0,33	3,85
<i>Symposiocladius lignicola</i> K.	0,33	11,54

Species	Dominance %	Abundance %
<i>Cricotopus bicinctus</i> Mg.	0,25	34,62
<i>Demicryptochironomus vulneratus</i> Zett.	0,25	11,54
<i>Nanocladius bicolor</i> Zett.	0,25	11,54
<i>Corynoneura celeripes</i> Win.	0,16	42,31
<i>Cricotopus fuscus</i> K.	0,16	38,46
<i>Cryptotendipes anomalous</i> K.	0,16	3,85
<i>Eukiefferiella brevicornis</i> K.	0,16	3,85
<i>Eukiefferiella tshernovskii</i> Pankr.	0,16	19,23
<i>Paraccladius rolli</i> Kirp.	0,16	3,85
<i>Cricotopus annulator</i> Goetgh.	0,16	3,85
<i>Cricotopus tremulus</i> Linnaeus	0,16	15,38
<i>Limnophyes pusillus</i> Eaton	0,16	3,85
<i>Parakiefferiella bathophila</i> K.	0,11	30,77
<i>Campiochironomus tentans</i> Fabr.	0,08	26,92
<i>Cladopelma laccophila</i> K.	0,08	30,77
<i>Clinotanytarsus nervosus</i> Mg.	0,08	69,23
<i>Corynoneura lemnae</i> Frauenfeld	0,08	3,85
<i>Cricotopus albiforceps</i> K.	0,08	15,38
<i>Cricotopus sylvestris</i> Fabr.	0,08	3,85
<i>Einfeldia pectoralis</i> K.	0,08	3,85
<i>Glyptotendipes caulinellus</i>	0,08	3,85
<i>Kiefferulus tendipediformis</i> Goetgh.	0,08	19,23
<i>Lenzia flavipes</i> Mg.	0,08	3,85
<i>Metriocnemus hygroptericus</i> K.	0,08	3,85
<i>Parachironomus arcuatus</i> Goetgh.	0,08	11,54
<i>Paratendipes connexens</i> Lipina	0,08	3,85
<i>Procladius conversus</i> Walk.	0,08	23,08
<i>Psectrocladius barbimanus</i> Edw.	0,08	3,85
<i>Tanytarsus punctipennis</i> Mg.	0,08	34,62
<i>Thienemanniella vittata</i> Edw.	0,08	3,85
<i>Thienemanniella vittata</i> Edw.	0,08	3,85

Table 13. Chironomid species dominance and abundance in the tributaries of the R. Crișul Repede - 1995.

Species	Dominance	Abundance
	%	
<i>Orthocladius thienemanni</i> K.	25,82	10,00
<i>Micropsectra praecox</i> Mg.	15,18	20,00
<i>Orthocladius saxicola</i> K.	9,14	10,00
<i>Eukiefferiella breviceps</i> K.	6,58	10,00
<i>Prodiamesa olivacea</i> Mg.	6,54	10,00
<i>Pentapedilum sordens</i> v. d. Wulp	5,12	10,00
<i>Psectrocladius dilatatus</i> v. d. Wulp	5,06	10,00
<i>Thienemannimyia lentiginosa</i> Fries	4,56	10,00
<i>Psectrocladius simulans</i> Joh.	2,53	10,00
<i>Eukiefferiella clypeata</i> K.	2,03	10,00
<i>Macropelopia nebulosa</i> Mg.	2,02	10,00
<i>Nanocladius bicolor</i> Zett.	1,52	20,00
<i>Psectrocladius barbimanus</i> Edw.	1,07	40,00
<i>Ablabesmyia monilis</i> Linnaeus	1,01	10,00
<i>Eukiefferiella tshernovskii</i> Pankr.	1,01	10,00
<i>Krenopelopia binotata</i> Wied.	1,01	60,00
<i>Limnophies pusillus</i> Eaton	1,01	40,00
<i>Polypedilum nubeculosum</i> Mg.	1,01	40,00
<i>Polypedilum scalaenum</i> Schr.	1,01	40,00
<i>Tanytarsus gregarius</i> K.	1,01	50,00
<i>Cladotanytarsus mancus</i> Walk.	0,64	10,00
<i>Clinotanypus nervosus</i> Mg.	0,54	20,00
<i>Cricotopus fuscus</i> K.	0,51	20,00
<i>Lenzia flavipes</i> Mg.	0,51	40,00
<i>Limnophies hydrophilus</i> Goetgh.	0,51	20,00
<i>Microtendipes chloris</i> Mg.	0,51	20,00
<i>Paracladopelma camptolabis</i> K.	0,51	10,00
<i>Paratendipes intermedius</i> Tsh.	0,51	10,00
<i>Polypedilum minutum</i> Krug.	0,51	20,00
<i>Tanytarsus curticornis</i> K.	0,51	30,00
<i>Trissopelopia longimana</i> Staeg.	0,51	10,00
	100,00	100,00



Table 14. Diversity of the the examined rivers by the chironomid fauna

R. Crişul Alb (Fehér-K.)-1994			River C. Repede (S-Körös) - July, 1995.			
Source area	main current	0,45	Source area	near the bank	0,61	
	near the bank	0,65		main current	0,41	
	fresh alder leaves in water	0,48	Aleşd	near the bank	0,42	
Brad	navvy holes	0,66		2 ms from the bank	0,53	
	main current	0,37		near the bank	0,22	
Ch. Criş	main current	0,46		26 ms from the bank	0,31	
			Bologa	near the bank	0,00	
R. C. Negru - Fekete-K. (1994.)				2 ms from the bank	0,33	
Source area	near the bank	0,42		main current	0,40	
	gravels	0,56	H. St. Vale	near the bank	0,49	
P. Groza	sandy sediment	0,00	Ciucea	right side bank	0,42	
	gravels	0,54		main current	0,48	
Borz	clay and gravels	0,64			left bank	0,19
Tinca	phytotecton	0,29			2 ms from the left bank	0,53
Zerind	main current	0,1694		near the bank	0,61	
	near the left bank	0,3675	Osorhei	near the bank	0,70	
Almaş	near the rigt bank	0,50		6 ms from the bank	0,59	
Ineu	near the bank	0,56		main current	0,45	
River Kettős-K.				near the bank	0,50	
Gyula	clay	0,65		2ms from the bank	0,73	
Sarkad	clay	0,21	Fugiu	main current	0,67	
Békés	left bank	0,31			main current	0,59
R. Hármas-K.			Cheresig	near the bank	0,18	
Csongrád	left bank	0,09			2ms from the bank	0,15
	main current	0,21			main current	0,48
					qualitative	0,31
		Drăgan Stream	near the bank	0,33		
			gravels	0,21		
			near the bank	0,29		
			main current	0,48		
		Iad Stream	near the bank	0,43		
			2 m from the side	0,39		
			main current	0,57		
			near the bank	0,70		
		Zarna Stream	near the bank	0,17		
		Szeghalom	near the bank	0,30		

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